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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/665,238	09/17/2003	Michael T. Andreas	2269-5981US (02-1592.00/U)	6261
24247	7590	09/01/2004	EXAMINER	
TRASK BRITT P.O. BOX 2550 SALT LAKE CITY, UT 84110			LEBENTRITT, MICHAEL	
			ART UNIT	PAPER NUMBER
			2824	

DATE MAILED: 09/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/665,238

Applicant(s)

ANDREAS, MICHAEL T.

Examiner

Michael S. Lebentritt

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1,4,5,8-11 and 14 is/are rejected.
- 7) ☒ Claim(s) 2,3,6,7,12 and 13 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 September 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Information Disclosure Statement

The information disclosure statement (IDS) submitted on 9/17/2003 was filed before the mailing date of the first action on the merits. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Drawings

Figures 1A-1K should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.121(d)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1,4,5,8,9,10,11, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art (AAPA) and further in view of Ohashi et al, 6,376,345.

AAPA discloses: etching at least one opening (23) through the dielectric layer (16) and the barrier layer (14) to expose at least a portion of the underlying copper metallization layer (12) and form an etched structure; and subjecting the etched structure to an aqueous solution in an environment. Further: wherein subjecting the etched structure to an aqueous solution comprises subjecting the etched structure to an aqueous solution comprising dilute hydrofluoric acid. Further: forming a barrier layer (14) over at least a portion of the underlying copper metallization layer (12); and forming a dielectric layer (16) over at least a portion of the barrier layer (14). Also further comprising forming a diffusion barrier (26) over the etched structure; forming a bulk copper layer (30) over the diffusion barrier (26) such that the at least one opening is filled therewith; and planarizing the bulk copper layer to a surface of the dielectric layer.

AAPA is applied supra but lacks anticipation subjecting the etched structure to an aqueous solution in an environment wherein the etched structure is substantially shielded from ambient light. Ohashi discloses providing a shading portion (150) for the immersing portion (or wafer stocking portion) after etching. See figures 1-12 and discussion on column 11, line 8 to column 15, line 30. In view of this disclosure it would have been obvious to one of ordinary skill in the art at the time of invention to subject the etched structure to an aqueous solution in an environment wherein the etched structure is substantially shielded from ambient light as taught by Ohashi, in view of the

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primary reference of AAPA, because the shading portion prevents the surface of the wafer from being corroded by exposure to ambient light.

Claims 1,4,5,8,9,10,11, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art (AAPA) and further in view of Edelstein et al, US Patent 6,153,043

AAPA discloses: etching at least one opening (23) through the dielectric layer (16) and the barrier layer (14) to expose at least a portion of the underlying copper metallization layer (12) and form an etched structure; and subjecting the etched structure to an aqueous solution in an environment. Further: wherein subjecting the etched structure to an aqueous solution comprises subjecting the etched structure to an aqueous solution comprising dilute hydrofluoric acid. Further: forming a barrier layer (14) over at least a portion of the underlying copper metallization layer (12); and forming a dielectric layer (16) over at least a portion of the barrier layer (14). Also further comprising forming a diffusion barrier (26) over the etched structure; forming a bulk copper layer (30) over the diffusion barrier (26) such that the at least one opening is filled therewith; and planarizing the bulk copper layer to a surface of the dielectric layer.

AAPA is applied supra but lacks anticipation subjecting the etched structure to an aqueous solution in an environment wherein the etched structure is substantially shielded from ambient light. Edelstein discloses providing a darkened enclosure (100) for use brush cleaning, unloading and rinsing. See figure 1 and discussion on column 7, line39 to 64. In view of this disclosure it would have been obvious to one of ordinary skill

in the art at the time of invention to subject the etched structure to an aqueous solution in an environment wherein the etched structure is substantially shielded from ambient light as taught by Edelstein, in view of the primary reference of AAPA, because the darkened enclosure eliminates exposure to ambient light preventing photovoltaic effects and dissolution.

Allowable Subject Matter

Claims 2,3,6,7,12, and 13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

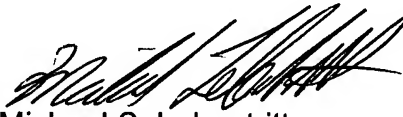
The following is a statement of reasons for the indication of allowable subject matter: prior art references fail to teach wherein subjecting the etched structure to an aqueous solution comprises subjecting the etched structure to an aqueous solution comprising about 7.0% by weight acetic acid, about 0.4% by weight nitric acid and about 0.15% by weight hydrofluoric acid.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael S. Lebentritt whose telephone number is 571-272-1873. The examiner can normally be reached on 5/4/9.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Elms can be reached on 571-272-1869. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Michael S. Lebentritt
Primary Examiner
Art Unit 2824
